

REMARKS

Claims 1-14 are currently pending in the application, as amended. Independent claim 1 has been amended to more particularly point out and claim the invention. Support for the amendment of claim 1 is found in the specification, for example, page 5, lines 15-22 and in Fig. 2c. Claims 5 and 6 have been amended for consistency with amended claim 1. New claims 8-14 have been added. New independent claim 8 comprises the subject matter of original claim 1 along with additional features to more particularly point out and claim the invention. Support for new claim 8 is also found in the specification at page 5, lines 15-22 and in Fig. 2b. New dependent claims 9-14 comprise the subject matter of original dependent claims 2-7. Thus, claims 1-7 include the embodiment of Fig. 2c with measuring element 1', and claims 8-14 include the embodiment of Fig. 2b with measuring element 1. No new matter has been added with this amendment.

Claim Rejections - 35 U.S.C. § 103 – Claims 1-3 and 5-7

The Examiner has rejected claims 1-3 and 5-7 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,660,473 (Noma *et al.*, hereinafter “Noma”) in view of U.S. Patent No. 6,297,723 B1 (Shoji *et al.*, hereinafter “Shoji”). The Examiner contends that Noma discloses the basic claimed temperature sensor, with the exception that Noma fails to disclose a temperature measuring element being arranged on a circuit board such that the measuring element is arranged in a tip region of the protective tube on one end of a longitudinally extending circuit board and connected via strip conductors to a plug arrangement positioned on an opposite end of the circuit board. The Examiner further contends that Shoji discloses a thermistor mounted on a circuit board / ceramic substrate provided with strip conductors such that the thermistor is arranged on the circuit board in a tip region of a protective tube on one end of a longitudinally extending circuit board and is connected via the strip conductors to a plug arrangement positioned at an opposite end of the circuit board. In view of the foregoing amendment, Applicants respectfully traverse this rejection.

Claim 1, as amended, recites, *inter alia*:

the measuring element (1') is **a surface-mountable component (SMD)** which is arranged in a tip region of the protective tube (11)

and **connected to contact pads (45, 46)** on one end of a longitudinally extending circuit board (2)

Claim 1 has been amended to clarify that in one preferred embodiment the temperature measuring element is a surface-mountable electronic component, known in the vernacular of those skilled in the art of electronics manufacturing as an “SMD”. An “SMD” is defined to be “any electrical or mechanical component that can be attached to the surface of a substrate **with solder**” (emphasis added). *Glossary of Acronyms Relevant to Electronics Manufacturing*, the Surface Mount Technology Association. Claim 1 has been further amended to clarify that the measuring element is connected with contact pads, and that the contact pads are connected via strip conductors to a plug arrangement. Support for these amendments is found at multiple points in the specification, including at page 3, lines 8-10; page 4, lines 17 and 18; and page 5, lines 15-23. Page 5, lines 15-23 provides:

[a]ccording to Fig. 2a, the unequipped circuit board 2 (no components on it) **has respectively contact pads 41, 42 for electrical and mechanical connection with an SMD measuring element to be mounted**, wherein additional connection pads 23, 24 are provided, which are provided for the assembly of measuring elements with connection wires.

According to Fig. 2b, it is thus possible to connect, electrically and mechanically firmly, a measuring element 1 via connection wires 21, 22 to the contact pads 23, 24, **whereas in Fig. 2c, the possibility of an SMD-mounting using SMD contacts 45, 46 of a measurement element 1' is also shown**.

The amendment is further supported by Fig. 2c.

As admitted by the Examiner, Noma fails to disclose each and every feature of the present invention. Noma fails to disclose at least a temperature measuring component which is an SMD component and contact pads in contact with the SMD temperature measuring component. Noma discloses a thermal sensor comprising two thermistors used to detect temperature of cooling water in an engine. Noma incorporates into a single housing a first thermistor 9 used as part of an electrical circuit providing an electrical signal to an Engine Control Unit (ECU) and a second thermistor 12 used as part of a second electrical circuit providing an electrical signal to a temperature gauge. The thermistors 9 and 12 of Noma are not disclosed to be elements which are mountable to a circuit board. Accordingly, there is no

objective teaching in Noma that would enable one of ordinary skill in the art to modify the invention of Noma in a manner that would render the present invention obvious under 35 U.S.C. § 103(a).

Shoji fails to disclose each and every feature of the present invention. Shoji fails to disclose at least an SMD temperature measurement component mounted to a circuit board with solder and connected to contact pads. Shoji discloses a thin-film temperature detecting element 3 (embodiments 1 and 2) or 23 (embodiments 3 and 4) formed by a CVD (chemical vapor deposition) method (Column 3, lines 2-4, Column 5, lines 38-40). The thin-film temperature detecting element 3, 23 is electrically connected to the remainder of the thermal sensor by thin film electrodes 4 (Column 3, lines 6-10, Column 5, lines 46-50). The temperature measurement detecting element of Shoji is thus an entirely different device mounted to supporting structure and electrically connected to the other electrical components in an entirely different manner from the SMD temperature measurement component and associated electrodes of the present invention. Accordingly, there is no objective teaching in Shoji that would enable one of ordinary skill in the art to modify the invention of Shoji in a manner that would render the present invention obvious under 35 U.S.C. § 103(a).

In establishing a *prima facie* case of obviousness, the Examiner must show, *inter alia*, that the prior art references teach or suggest all of the claim limitations. See M.P.E.P. § 2142. Applicants respectfully submit that the Examiner has failed to establish a *prima facie* case of obviousness under 35 U.S.C. § 103(a). The proposed combination of Noma and Shoji fails to teach, disclose or suggest at least the elements of an SMD temperature measurement component connected to contact pads. As the combination of references fails to teach or suggest all of the elements of claim 1, as amended, of the Applicants' invention, it is respectfully submitted that a *prima facie* case for obviousness has not been established with respect to claim 1 or with respect to claims 2, 3, and 5-7 which depend directly or indirectly from claim 1. Accordingly, Applicants respectfully request that the rejection of claims 1-3, and 5-7 under 35 U.S.C. § 103(a) be withdrawn.

Claim Rejections - 35 U.S.C. § 103 – Claim 4

The Examiner has rejected claim 4 under 35 U.S.C. § 103(a) as being unpatentable over Noma in view of Shoji in further view of U.S. Patent No. 5,697,706 (Ciaravino *et al.*, hereinafter “Ciaravino”). The Examiner contends that the combination of Noma and Shoji discloses a sensor as claimed, with the exception of failing to disclose a connection piece secured against turning relative to a screw sheath by locking beads and / or recesses. The Examiner further contends that Ciaravino teaches use of recesses in combination with bead/tabs to prevent rotation of a measuring element with respect to a probe housing. In view of the foregoing amendment, Applicants respectfully traverse this rejection.

As discussed above, the proposed combination of Noma and Shoji fails to teach, disclose or suggest each and every element of claim 1, as amended. Ciaravino similarly fails to teach, disclose or suggest at least the element of an SMD temperature measurement component connected to contact pads. Ciaravino discloses a temperature probe having a plurality of separate thermocouples arranged in a probe tip to allow heat gradients to be determined. More specifically, Ciaravino discloses conventional thermocouples 100 in contact with rings 92. As the proposed combination of references fails to teach, disclose or suggest all of the elements of claim 1, as amended, of the Applicants’ invention, it is respectfully submitted that a *prima facie* case for obviousness has not been established with respect to claim 4 which depends directly from claim 1. Accordingly, Applicants respectfully request that the rejection of claim 4 under 35 U.S.C. § 103(a) be withdrawn.

Claim Rejections - 35 U.S.C. § 103 – Claims 1 and 6

The Examiner has rejected claims 1 and 6 under 35 U.S.C. § 103(a) as being unpatentable over Noma in view of U.S. Patent No. 6,341,892 B1 (Schmermund). The Examiner contends that Noma discloses the basic claimed temperature sensor, with the exception that Noma fails to disclose a temperature measuring element being arranged on a circuit board such that the measuring element is arranged in a tip region of the protective tube on one end of a longitudinally extending circuit board and connected via strip conductors to a plug arrangement positioned on an opposite end of the circuit board. The Examiner further contends that Schmermund discloses a thin film platinum resistor mounted on a circuit board / ceramic

substrate provided with strip conductors. In view of the foregoing amendment, Applicants respectfully traverse this rejection.

As discussed above, Noma fails to teach, disclose or suggest each and every element of claim 1, as amended. Schmermund similarly fails to disclose at least the element of an SMD temperature measurement component connected to contact pads. Schmermund discloses use of various resistance temperature sensors (Column 4, lines 49-53) as a temperature measurement device. Schmermund does not teach, disclose or suggest the temperature measurement devices being an SMD component mounted to a circuit board with solder. As the proposed combination of references fails to teach or suggest all of the elements of claim 1, as amended, of the Applicants' invention, it is respectfully submitted that a *prima facie* case for obviousness has not been established with respect to claim 1 or with respect to claim 6 which depends directly from claim 1. Accordingly, Applicants respectfully request that the rejection of claims 1 and 6 under 35 U.S.C. § 103(a) be withdrawn.

New claims 8-14

Applicants have added new independent claim 8 and new dependent claims 9-14 depending directly or indirectly therefrom. New independent claim 8 comprises the subject matter of original claim 1 along with additional features to clarify that in a second preferred embodiment the temperature measuring element is connected via connection wires to contact pads mounted on a circuit board, and that the contact pads are connected via strip conductors to a plug arrangement. Support for new claim 8 is found in original claim 1 as well as at multiple points in the specification, including at page 4, lines 11-16; and page 5, lines 15-23. Page 5, lines 15-23 provides:

[a]ccording to Fig. 2a, the unequipped circuit board 2 (no components on it) has respectively contact pads 41, 42 for electrical and mechanical connection with an SMD measuring element to be mounted, **wherein additional connection pads 23, 24 are provided, which are provided for the assembly of measuring elements with connection wires.**

According to Fig. 2b, it is thus possible to connect, electrically and mechanically firmly, a measuring element 1 via connection wires 21, 22 to the contact pads 23, 24, whereas in Fig. 2c, the

possibility of an SMD-mounting using SMD contacts 45, 46 of a measurement element 1' is also shown.

The amendment is further supported by Fig. 2b.

Applicants submit that the cited references, individually or in the combinations proposed by the Examiner, fail to teach, suggest or disclose a temperature sensor as described by claims 8-14. More particularly, Applicants submit that the cited references both individually and in combination fail to disclose or render obvious a temperature measuring component connected via connection wires to contact pads mounted on one end of a longitudinally extending circuit board, for substantially the same reasons discussed above with respect to claims 1-7. Accordingly, Applicant respectfully requests allowance of new claims 8-14.

CONCLUSION

In view of the foregoing amendment and remarks, Applicants respectfully submit that the present application, including claims 1-14, is in condition for allowance and such action is respectfully requested.

Respectfully submitted,

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June 13, 2003
(Date)

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